



Catalyst for Expanding Human Spaceflight

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Vision

The vision of commercial human spaceflight to low-Earth orbit is a robust, vibrant enterprise **with many providers** and a wide range of private and public users.



A successful human space transportation system will strengthen the International Space Station Program, allow NASA to focus on deep-space exploration, potentially reduce the cost of human access to space and significantly contribute to the national economy.

Leading to:

CCP NASA Purpose

Safe transport of NASA and NASA-sponsored astronauts to and from station.

CCP Public Purpose

Support the development of non-NASA markets for commercial human transportation services to and from low-Earth orbit.

Industries with Government Roots

Many commercial industries developed after significant technology development and operations by the government sector. Several examples include:

- Railroads
- Subsea
- Air Transport
- Communications
- Internet
- Launch Services
- Cargo Resupply for the International Space Station

Commercial Airline Industry

A 20th Century Success Story

Establishing the Need:

- The government's initial need for aviation stemmed from military and airmail activities
- The post office later created minimal airmail routes

Laying the Ground Work:

- Congress turned over airmail service to industry
 - Airmail volume increased dramatically and commercial air transport finally “took off”



Commercial Airline Industry

A 20th Century Success Story

Enabling Industry:

- The government transitioned infrastructure to industry
 - Lighted airfields for night and weather operation
 - Provided radio equipment for weather information
- Post office paid industry based on weight and distance
- Government allowed industry to carry mail in any unused capacity
 - Reduced passenger expenses



Commercial Airline Industry

A 20th Century Success Story

Supporting Legal Framework:

- The U.S. Air Commerce Act of 1926 established initial aviation regulations
- High-profile accidents revealed the need for uniform safety
- Following WWII, air travel became international
 - Industry asked for standardized operational and safety practices
 - The Chicago Convention in 1944 to establish international standards
 - That framework balanced industry's needs and public safety
 - Issued and enforced air traffic rules
 - Licensed pilots and certified aircraft
 - Established airways
 - Operated and maintained aids for air traffic control



Commercial Human Spaceflight Industry

Writing a 21st Century Success Story

- One of NASA's core missions is to advance the human exploration, use and development of space to benefit the quality of life on Earth
- Increasing the scale and diversity of commercial activity in space is essential to fulfilling this mission
- In 2010, NASA established a philosophy to engage and partner with the commercial aerospace industry to develop crew transportation systems (CTS) that would meet the agency's low-Earth orbit and International Space Station requirements and foster a new human spaceflight industry

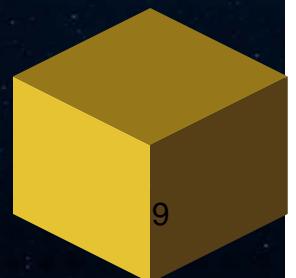


How Do We Do That?

Through an incremental, building block approach

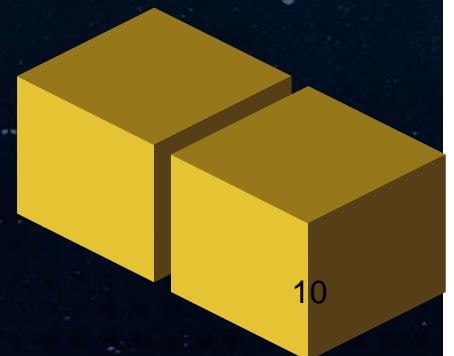
Building Block 1: Establishing the Need

- In 2008, NASA began transitioning its cargo delivery capabilities to the American aerospace industry
- Now, we're encouraging the American aerospace industry to serve NASA's needs for station crew rotations and critical science
 - Ability to perform other low-Earth orbit missions
 - Crew transportation services
 - Powered scientific cargo
 - 210 days in orbit
- Transition space activities not involving inherently governmental functions to non-governmental organizations, allows NASA to focus on deep space
- We're looking to industry to meet our needs, thereby acting as a catalyst to propel commercial human spaceflight forward



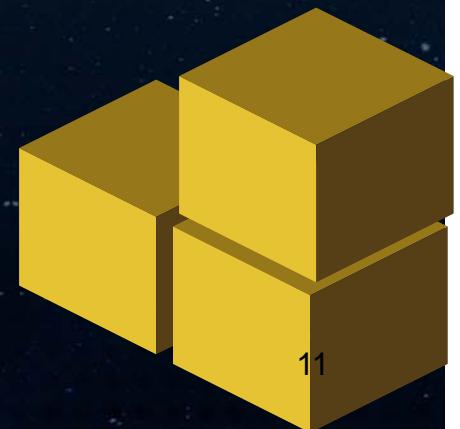
Building Block 2: Laying the Groundwork

- We're providing 50 years of spaceflight knowledge
 - Transferring lessons learned from Apollo to today
 - Identifying what areas are critical for verification
- Establish and define partnerships with American aerospace industry
 - Initial space system designs
 - Collaborative technical interchange
- Balancing liability and risk posture to maintain competitiveness
- Spurring industry development
 - Space Act Agreements were used to invest in the development of subsystems, systems and then integrated space systems
 - Now, we're certifying integrated space systems and buying services
 - Although NASA is the anchor tenant, the development will spur future ideas and needs



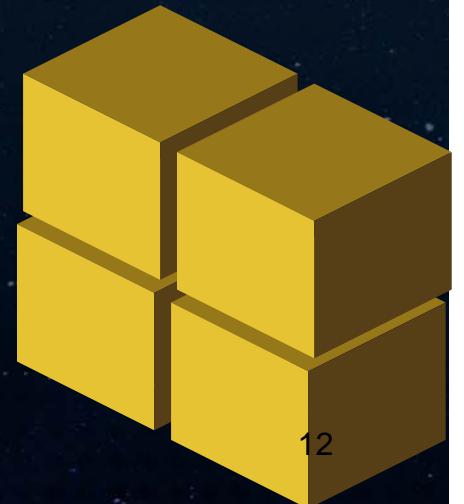
Building Block 3: Enabling Industry

- Keeping mission-specific needs at a high-level
 - Balancing government and industry needs
 - Allows industry expand the business model for its system
- We're making infrastructure assets available for use by industry
 - Launch Pads, Processing Facilities, Mission and Launch Control Center, on-orbit communications, ground tracking
- Allow companies to retain intellectual property rights
 - Opens the door to sponsorships, partnerships and collaborations
 - Retains company value on investments



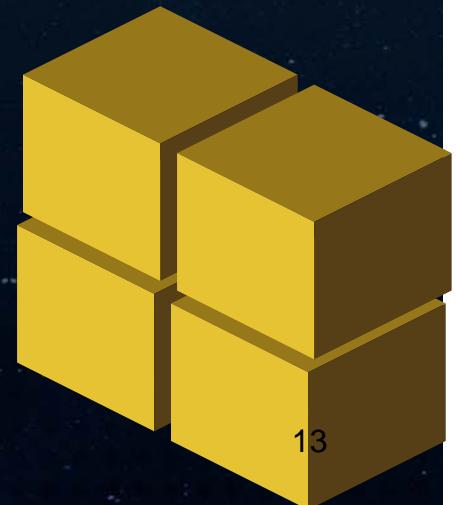
Building Block 4: Legal Framework

- Historically the legal and regulatory framework has been responsive to industry development
- For NASA, the international community and industry to continue on a sustainable path, a legal framework is needed to enable industry to flourish safely, reliably and cost-effectively
 - Create a set of uniform industry standards
 - Define common terms, jurisdiction and adjudication
 - License missions
 - Accommodate civilian and commercial spaceflight transportation
- It will be hard and the risks are high, but there is a balance between how we enable industry without prohibiting it



Building Block 4: Legal Framework

- Governments and regulators primary focus always remains public safety and welfare and protections for the common good
- Governments also have an interest in promoting new industries and markets to advance growth and prosperity
- Industry has an important stake in assisting governments by proactively developing safety regimes while remaining mindful of marketplace opportunities.
- Government and industry collaboration can more efficiently achieve transnational standardization and uniformity



Going Forward

- We are on the cusp of a vibrant commercial space market
- NASA, through the Commercial Crew Program, will continue to be the catalyst for a vibrant and emerging commercial human spaceflight industry
- Industry will establish leadership in maturing the environment
 - Continue to perform and mature capabilities and markets
 - Collaborate for industry-wide standards
 - Uniformity and common interfaces
 - Self-adopted and governed
 - Engage and assist regulatory bodies to continue maturation of practices and regulations

Summary



The Commercial Crew Program continues to execute its mission under the framework that was outlined in 2010. This allows industry to meet our critical needs, while providing a stepping stone to the future of commercial space.

